

A Temporary Slope Drain is a flexible tubing or pipe used to convey concentrated runoff from the top to the bottom of a cut or fill slope without causing significant erosion along the slope. An earth berm is an earthen barrier designed to channel runoff into a number of erosion control devices which is ideally suited to be used in conjunction with the temporary slope drain until permanent water disposal measures are installed. The pipe should be long enough to extend down the slope and turned into a prescribed erosion control device.

AREAS OF USE:

- At construction areas where storm water runoff above a cut or fill slope will cause erosion if allowed to flow over a slope.
- Slope drains and earth berms are not required for fill slopes that are 4:1 or flatter.

DESIGN CRITERIA:

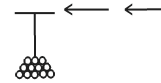
- Slope Drain capacity should be the peak runoff from the 10-yr storm.
- When silt basins are utilized in conjunction with slope drains, size the silt basin with a 2:1 minimum length to width ratio.
- Place slope drains on fill slopes that are 8 feet or higher and a fill slope grade steeper than 4:1, or where there are superelevations above 0.04 and fills are greater than 5 feet.
- Place temporary slope drains and earth berms at top of fill slopes 5 ft or higher and a fill slope grade steeper than 4:1, or where there are super elevations above .04 and fills are greater than 3 ft. for projects in Divisions 1, 2, 3, and 6.
- Pipe Size-Unless individually designed, size slope drains in accordance with the following:

Maximum drainage Area per pipe (acres)	Pipe Diameter (inches)
0.50	12
0.75	15
1.00	18
>1.00*	as designed

Table 6.32, Erosion and Sediment Control Planning and Design Manual, NCDENR

CONSTRUCTION SPECIFICATIONS:

- Slope drains shall be installed in conjunction with grading and adjusted to coincide with height of embankment as construction progresses.
- Install reinforced, hold-down grommets or stakes to anchor the conduit at intervals not to exceed 10 ft. with the outlet end securely fastened in place. The conduit must extend beyond the toe of the slope.
- Construct the slope drain so that erosion or scouring does not occur underneath or around the sides of the inlet.



- When using the earthen berm in conjunction with the slope drain, ensure lowest point of berm ridge is at a minimum 1 ft. above the top of the drain so that design flow can freely enter the drain.
- Allow slope drain outlet to exit into prescribed erosion control device, i.e., temporary slope ditch, silt basin or sediment dam. If it is not feasible to place outlet of drain into a device, control outlet velocity and erosion by utilizing a Class B stone energy dissipater pad if necessary.
- Construction methods of temporary slope drain shall comply with section 1622.01 of the Standard Specifications.
- Maximum slope drain spacing shall be 200 ft.

MATERIAL SPECIFICATIONS:

- Construct the slope drain from heavy-duty, flexible materials such as non-perforated, corrugated plastic pipe or specially designed flexible tubing.
- Construct earth berms with on-site unclassified earth material.
- Structural stone at slope drain inlet shall be class B stone that meets the requirements of Section 1042 of the Standard Specifications for Stone for Erosion Control, Class B.
- Sediment control stone at slope drain inlet shall be #5 or #57 stone, which meets the requirements of Section 1005 of the Standard Specifications for these stone sizes.

PAYMENT:

- Installation of measure:

Temporary Slope Drain

Linear Foot

Inlet Protection at Temporary Slope Drain

EA

MAINTENANCE:

- Inspect slope drains after each significant rainfall.
- Rebuild earth berms and inlets that have weakened due to scouring.
- Rebuild slope drains as fill is built, approximately after each 2 feet of height.
- Rebuild or repair slope drains if needed when seeding and mulching is performed.
- Rebuild Class B stone outlet protection and clean as needed.

TYPICAL PROBLEMS:

- Slope drains that empty off-site without passing water through a specified erosion control device such as a temporary silt ditch, silt basin, sediment dam, etc.
- Washes under and around (piping) inlet where earth material is not compacted properly.
- Pipe is too short.
- Pipe is leaking at joints or not properly connected together.
- Outlet ends of pipe are clogged or under silt so that flow cannot continue.
- Silt basins, built at top of slope drain, can contribute to problems of piping around inlet.
- Shifting of slope drain due to improper staking, or the absence of staking.